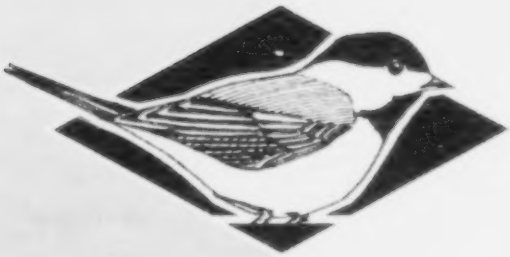
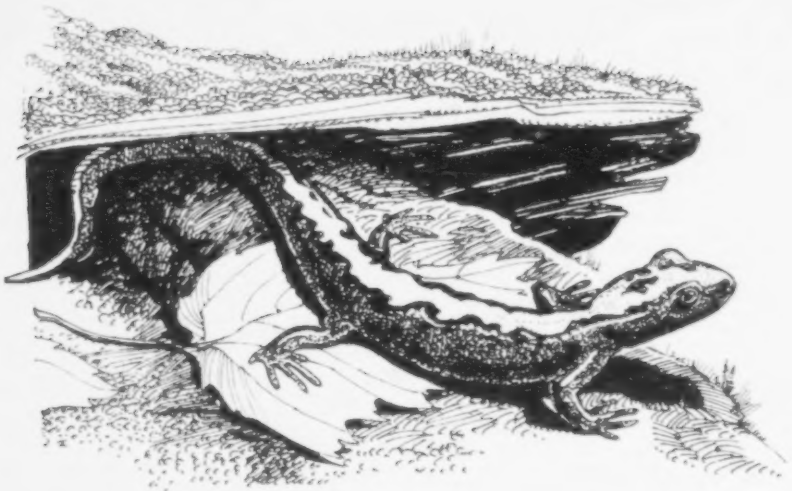


Fish & Wildlife Division

RESOURCE DATA AND SPECIES AT RISK SECTION

RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2004 PROVINCIAL SUMMARY



Alberta Species at Risk Report No. 95

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

105-05070

RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2004 PROVINCIAL SUMMARY

Lisa Wilkinson and Gavin Berg

Alberta Species at Risk Report No. 95

Project Partners:

Alberta Sustainable Resource Development Fish & Wildlife

Weldwood

Alberta Conservation Association

Friends of Saskatoon Island

Heritage Association of Cypress Hills

University of Alberta

Publication No.: I/209
ISBN: 0-7785-4048-0 (Printed Edition)
ISBN: 0-7785-4049-9 (Online Edition)
ISSN: 1496-7219 (Printed Edition)
ISSN: 1496-7146 (Online Edition)

Illustration: Brian Huffman

For copies of this report, contact:

Information Centre – Publications
Alberta Environment / Alberta Sustainable Resource Development
Main Floor, Great West Life Building
9920 108 Street
Edmonton, Alberta, Canada, T5K 2M4
Telephone (780) 422-2079

OR

Visit our website at:
http://www3.gov.ab.ca/srd/fw/riskspecies/

This publication may be cited as:

Wilkinson, L. and G. Berg. 2004. Researching Amphibian Numbers in Alberta (RANA): 2004 provincial summary. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No.95. Edmonton, AB.

DISCLAIMER

The views and opinions expressed are those of the authors and do not necessarily represent the policies of the Department or the Alberta Government.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS VI

EXECUTIVE SUMMARY VII

1.0 INTRODUCTION 8

2.0 STUDY AREA 9

3.0 METHODS 10

3.1 Pitfall Trapping 10
3.2 Pond Surveys 11

4.0 RESULTS 12

4.1 Pitfall Trapping 12
4.2 Pond Surveys 13
4.3 Education 15

5.0 DISCUSSION 15

6.0 LITERATURE CITED 17

7.0 APPENDICES 18

Appendix 1. Summary of historic amphibian captures at each RANA site. 19
Appendix 2. Trends in amphibian captures at each RANA site (1997-2004). 22
Appendix 3: Pond survey results for wood frogs, long-toed salamanders, boreal toads, boreal chorus frogs and Columbia spotted frogs at selected RANA sites. 26

LIST OF FIGURES

Figure 1. Alberta distribution of RANA sites. 9
Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B).10
Figure 3. Average captures per trap night for each species at all RANA sites, 1997-2004. 12
Figure 4a. Hinton: adult and young-of-the-year (YOY) long-toed salamander captures per trap night, 2002-04. 13
Figure 4b. Kananaskis: adult and young-of-the-year (YOY) long-toed salamander captures per trap night, 2002-04. 13

LIST OF TABLES

Table 1. Results for 2004 pond surveys in RANA sites and Jasper National Park. 14
Table 2. Summary of educational programs delivered to the public from all RANA sites in 2004. 15

ACKNOWLEDGEMENTS

Funding and support for this project were provided by the Alberta Conservation Association, Alberta Community Development, Alberta Sustainable Resource Development, Weldwood of Canada (Hinton Division), the Heritage Association of Cypress Hills, Friends of Saskatoon Island Provincial Park, University of Alberta, and Human Resources of Canada (Summer Career Placement Program). The following individuals conducted field research: Rosemary Ferjuc, Carla Froyman, Deanne Miskew, Amanda Martens, and Selwyn Rose. Field work coordination was assisted by Margot Hervieux, Kirsten Norris, Cindy Paszkowski, and Jan Proctor. Thank you to Ward Hughson for sharing data from Jasper National Park. We also thank the volunteers.

EXECUTIVE SUMMARY

This report summarizes results from the 2004 field season of the RANA program, and presents amphibian population trends from the history of the program. In 2004, six RANA sites were operated: Lesser Slave Lake Provincial Park (est. 1997), Meanook Research Station (est. 1997), Bow Valley (Kananaskis; est. 1998), Cypress Hills Provincial Park (est. 1999), Saskatoon Island Provincial Park (est. 1999), and Athabasca Valley (Hinton; est. 2000).

Six species of amphibians were captured in 2004. Long-toed salamanders were the most commonly captured amphibian species among all RANA sites (0.257 captures per trap night). All of these captures were at either Hinton or Kananaskis, the only sites within the salamander's range and where trapping ponds were established at known salamander breeding ponds. Wood frogs were the second most common species caught (0.118 captures per trap night), with the highest number caught at Lesser Slave Lake Provincial Park. Wood frogs were also the most widespread species, occurring at every site except Cypress Hills Provincial Park. Boreal toads were the third most common species, followed by boreal chorus frogs. Tiger salamanders and northern leopard frogs were the least common (0.022 captures per trap night) and only occurred at Cypress Hills Provincial Park. For the sixth year in a row, no Canadian toads were caught.

Spring pond surveys were conducted at 161 ponds in 5 of the 6 active RANA sites and six amphibian species were detected: wood frogs, long-toed salamanders, boreal chorus frogs, boreal toads, northern leopard frogs, and Columbia spotted frogs. Wood frogs were the most ubiquitous species, being observed at 61% of all ponds surveyed within their range, and long-toed salamanders were observed at 49% of the ponds within their range. The highest species diversity was recorded at both Hinton and Kananaskis with four different amphibian species. In Cypress Hills Provincial Park, the northern leopard frog was present at 34% of ponds surveyed.

Educational efforts took a variety of forms, including presentations, public displays, guided talks, and interpretive plays, and reached an estimated total of 3940 people throughout the province.

1.0 INTRODUCTION

In response to global declines in amphibian populations, Alberta initiated a long-term amphibian monitoring program, Researching Amphibian Numbers in Alberta (RANA), at two locations in 1997. The two primary objectives of the program are to: 1) collect long-term data on amphibian species populations in Alberta, and 2) provide public education on the importance of amphibians and wetland conservation.

Since 1997, the RANA program has operated at seven sites, representing different ecoregions. In 2004, as with 2003, six RANA sites were monitored: Lesser Slave Lake Provincial Park (est. 1997), Meanook Research Station (est. 1997), Bow Valley (Kananaskis; est. 1998), Cypress Hills Provincial Park (est. 1999), Saskatoon Island Provincial Park (est. 1999), and Athabasca Valley (Hinton; est. 2000). The Beaverhill Lake site has not been operated since 2000 due to logistic constraints. Refer to Figure 1 for RANA site locations.

The following species have been captured or observed in the RANA program: wood frogs (*Rana sylvatica*), boreal chorus frogs (*Pseudacris maculata*), Columbia spotted frogs (*Rana luteiventris*), northern leopard frogs (*Rana pipiens*), boreal (western) toads (*Bufo boreas*), Canadian toads (*Bufo hemiophrys*), long-toed salamanders (*Ambystoma macrodactylum*), and tiger salamanders (*Ambystoma tigrinum*). The only two Alberta amphibian species that have not been observed during the RANA program are the great plains toad (*Bufo cognatus*) and the plains spadefoot toad (*Spea bombifrons*), both of which are found in the grassland natural region, which is not currently surveyed. These species are also difficult to detect. Only one Canadian toad has been captured since the establishment of the RANA program, in 1998 at Lesser Slave Lake.

Only three of Alberta's ten amphibian species are considered 'secure'. Of the species encountered in the RANA program, the northern leopard frog is 'threatened', the Canadian toad is 'data deficient' ('may be at risk'), and the long-toed salamander and Columbia spotted frog are 'sensitive' (Alberta Sustainable Resource Development 2000). Long-toed salamanders are the focal species in Hinton and Kananaskis due to the current provincial objective to monitor their population distribution and trends for at least five years. Additional details of the salamander program are in Wilkinson and Hanus (2003a).

Public education has always been a fundamental component of the RANA program. Education takes the form of presentations, public event displays, guided hikes, school talks and other activities. Technical presentations are given to land-use managers (industry and government) and at biological conferences. In conjunction with RANA educational programs, the Alberta Amphibian Monitoring Program (AAMP) is promoted. This program encourages members of the public to record amphibian observations throughout the province.

This document is a compilation of 2004 field results from each RANA site, summarizing key findings and documenting amphibian trends since the inception of the program. More detailed data from the 2004 field season can be found in the individual field summary reports for each RANA site: Hinton (Berg and Wilkinson 2004), Kananaskis (Rose 2004), Lesser Slave Lake Provincial Park (Berg and Miskew 2004), Saskatoon Island Provincial Park (Berg and Ferjuc 2004), Cypress Hills Provincial Park (Berg and Froyman 2004), and Meanook Biological Research Station (Berg 2004).

2.0 STUDY AREA

The RANA program has sites distributed across Alberta (Figure 1) to represent a variety of natural regions (Alberta Environmental Protection 1994). Cypress Hills is located in a unique montane ecosystem within the grassland natural region, Kananaskis (Bow Valley) is located in the rocky mountain and foothills natural regions, Hinton (Athabasca Valley) is located in the foothills natural region, and the Meanook Biological Research Station, Lesser Slave Lake and Saskatoon Island Provincial Park sites are located in different parts of the boreal forest natural region. In addition, Jasper National Park conducted amphibian surveys (independent of the RANA program), representing the rocky mountain natural region.

Figure 1. Alberta distribution of RANA sites.

3.0 METHODS

Standard RANA methodology was used for surveying and capturing amphibians, which generally follows long-toed salamander inventory protocol (Pretzlaw et al. 2002), and is summarized below. Any variations to the methods are included in the individual site reports.

3.1 Pitfall Trapping

In each RANA survey area, there is one pond set up for pitfall trapping. The pond is completely or partially encircled with drift net fencing (Figure 2A). Pitfall traps are placed at 10 m intervals on either side of the fence. Theoretically, amphibians traveling to or from the pond will be intercepted by the fence and travel along the barrier until they fall into a trap. Traps consist of two 6-inch plastic flower pots taped together, creating a 12-inch deep trap (Figure 2B). Traps are covered by a square of coroplast, a sturdy and water resistant plastic, held above the traps by 6-inch nails. Trap covers ensure that amphibians are protected from excessive exposure to sun, which can lead to desiccation, and prevent flooding from rainfall (trap covers were not used at Cypress Hills because they prevented leopard frogs from entering traps, but traps were monitored regularly). The following items are placed in each trap: a sponge and/or moss, which is refreshed regularly to retain moisture; a rock that serves as a perch or hiding place; and a stick protruding past the top of the trap to allow small mammals to escape.

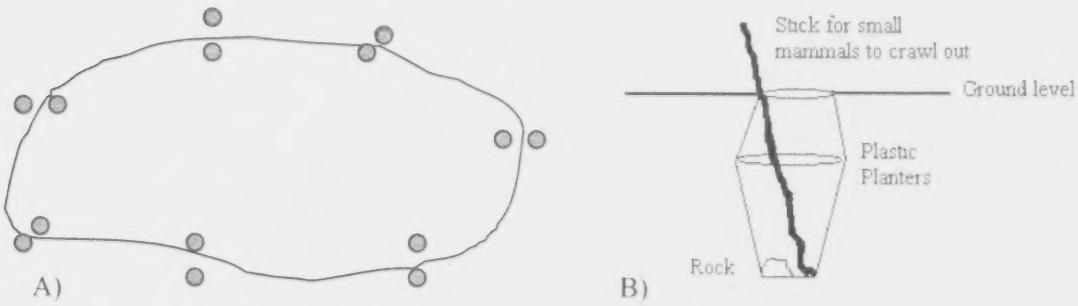


Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B).

Trapping schedules varied slightly between sites, but traps were generally set during the spring breeding season (May to early June), and late summer (August to early September) when young-of-the-year disperse from the ponds. The Meanook site was operated from July to mid-August for logistic reasons. Throughout the trapping sessions, traps were checked daily or every other day. Traps were generally closed during mid-summer when amphibian movement to and from ponds declined. Captured animals were identified to species, measured, weighed, and sex and age determinations were made when possible. Animals were released on the opposite side of the fence from which they were captured.

Other morphological characteristics, such as presence of dorsal stripes and malformations were also recorded. Small individuals captured at the beginning of the season were presumed to be juveniles (young-of-the-year from the previous season). Age and sex differentiation was not possible for all species. Researchers used latex gloves when handling amphibians to avoid contaminating amphibians with oils or hand lotion. Animals being released away from the pond were moistened and placed in a sheltered location; extra care was taken on hot days, releasing amphibians early or late in the day to prevent desiccation. Environmental data were also collected, including air and water temperature, pond pH, water depth, and other ambient conditions. At the Hinton RANA site, adult long-toed salamanders were marked with elastomer (a non-toxic latex) as part of an ongoing mark-recapture study (refer to Wilkinson and Hanus 2003 for details).

At the end of each trapping session all traps were closed by either pushing the coroplast cover flush to the ground and covering it with dirt and a rock, or by inverting traps, to ensure animals could not enter. Also, sections of fence were opened at several locations around the pond to allow animals to pass through.

3.2 Pond Surveys

Pond surveys were conducted to identify presence of breeding amphibians through observations of eggs, larvae, and young-of-the-year (adults were recorded but did not necessarily indicate breeding), as well as vocalizations. Survey efforts were most intensive during spring egg laying, although some ponds were visited later in the summer to look for presence of larvae.

Surveys were conducted by walking along the perimeter of a pond, or using transects for large and/or partially inaccessible water bodies, and looking for signs of amphibian presence. Surveys could not be conducted under excessively windy or rainy conditions because the surface of the water was disturbed. Similarly, care was taken not to disturb the surface of the water around the shoreline. Data recorded included number of salamander eggs, number of frog egg masses, and number of toad egg strings. For observations of larvae a specific count was made if possible, otherwise qualitative observations were made using estimates of few, moderate, or abundant (a similar system applies to vocalizations). The number of adults was also recorded. Environmental data were collected as per pitfall trapping ponds, and GPS locations were recorded for all ponds surveyed.

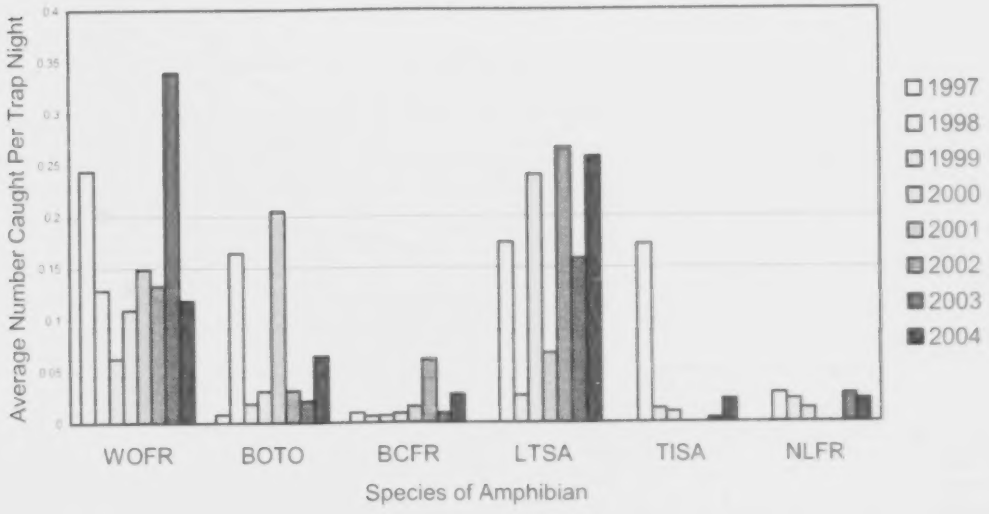
In some cases, due to logistic constraints, pond surveys were conducted strictly to establish presence or absence of breeding amphibians, so egg counts were approximated. In addition, species-specific surveys were conducted in the late summer to gather data on species for which current records were lacking (looking for tadpoles and emerging young-of-the-year). In the Hinton area, high elevation ponds were surveyed for evidence of Columbia spotted frogs, and in east-central Alberta, ponds with historic records of Canadian toads were surveyed.

4.0 Results

4.1 Pitfall Trapping

During the 2004 season, traps were operated during spring and late summer (Hinton, Kananaskis, Lesser Slave Lake Provincial Park, and Saskatoon Island Provincial Park), mid-summer (Meanook Biological Research Station), or all summer (Cypress Hills Provincial Park). Six amphibian species were captured; details of morphological characteristics are available in individual RANA site reports (Berg 2004, Berg & Ferjuc 2004, Berg & Froyman 2004, Berg & Miskew 2004, Berg & Wilkinson 2004, Rose 2004).

Long-toed salamanders were the most commonly captured amphibian species among all RANA sites in 2004 (0.257 captures per trap night). All of these captures were at either Hinton or Kananaskis, the only sites within the salamander's range. Wood frogs were the second most common species caught (0.118 captures per trap night), with the highest number caught at Lesser Slave Lake Provincial Park. They were also the most widespread species, occurring at every site except Cypress Hills Provincial Park. Boreal toads were third most common (0.064 captures per trap night) followed by boreal chorus frogs (0.027 captures per trap night). Tiger salamanders and northern leopard frogs were the least common (0.022 captures per trap night) and only occurred at Cypress Hills Provincial Park. For the sixth year in a row, no Canadian toads were caught. A provincial summary of captures per trap night since 1997 is in Figure 3, and site specific data of captures per trap night since 1997 are in Appendix 1, and capture trends are in Appendix 2.



Note: WOFR = wood frog, BOTO = boreal toad, BCFR = boreal chorus frog, LTSA = long-toed salamander, TISA = tiger salamander, NLFR = northern leopard frog

Figure 3. Average captures per trap night for each species at all RANA sites, 1997-2004.

In the Hinton trapping pond, the number of long-toed salamander young-of-the-year caught per trap night continued to decline in 2004, while the number of adults increased (Figure 4a; data based on spring trapping period for adults, and late summer trapping period for young-of-the-year). In the Kananaskis trapping pond, the number of young-of-the-year continued to increase in 2004, while the number of adults remained similar to previous years (Figure 4b).

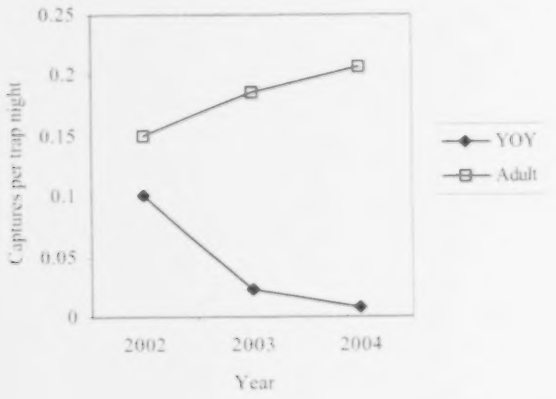


Figure 4a. Hinton: adult and young-of-the-year (YOY) long-toed salamander captures per trap night, 2002-04.

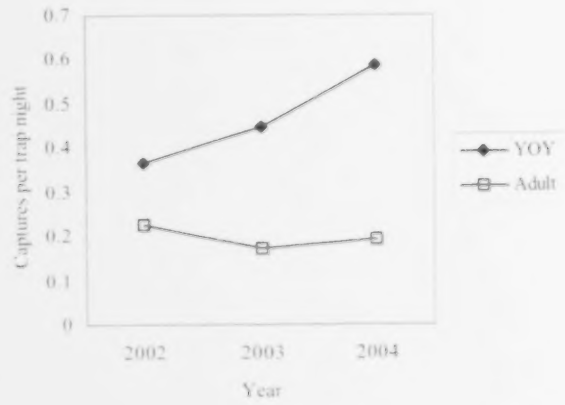


Figure 4b. Kananaskis: adult and young-of-the-year (YOY) long-toed salamander captures per trap night, 2002-04.

4.2 Pond Surveys

4.2.1 Spring and Summer Pond Surveys

Spring pond surveys were conducted at 161 ponds in 5 of the 6 active RANA sites and six amphibian species were detected (Table 1). For logistical reasons, pond surveys were not conducted at the Meanook Biological Research Station. Wood frogs were the most

ubiquitous species, being observed at 61% of all ponds surveyed within their range. Long-toed salamanders were observed at 49% of the ponds within their range. The highest species diversity was recorded at both Hinton and Kananaskis with four different amphibian species. In Cypress Hills Provincial Park, the northern leopard frog was present at 34% of ponds surveyed. Drought-like conditions limited pond surveys throughout the province; one historic breeding pond in Cypress Hills Provincial Park and 12 historic breeding ponds in Hinton dried up before surveys could be conducted. Persistence of species at selected RANA sites is in Appendix 3.

In 2004, Jasper National Park conducted amphibian surveys, focusing on the status of the boreal toad population within the montane regions of the park. The most common species found during their 146 pond surveys was the wood frog, occurring at 41.1% of the ponds. Boreal toads were the next most common species, with breeding evidence at 17.1% of the ponds. Surveys also identified presence of Columbia spotted frogs (10.3%), long-toed salamanders (9.6%) and boreal chorus frogs (1.4%), yielding a higher species diversity than any of the RANA sites in 2004 (Table 1; Stringer 2004).

Table 1. Results for 2004 pond surveys in RANA sites and Jasper National Park.

RANA SITE	# of ponds surveyed	BCFR	BOTO	CATO	CSFR	LTSA	NLFR	TISA	WOFR
Cypress*	32	20	0	0	0	0	11	0	0
Hinton**	69	4	11	0	0	37	0	0	49
Kananaskis	43	0	19	0	7	18	0	0	23
Lesser Slave Lake	15	9	3	0	0	0	0	0	6
Meanook	0	0	0	0	0	0	0	0	0
Saskatoon Island	2	1	1	0	0	0	0	0	1
Jasper	146	2	25	0	15	14	0	0	0
Total	**307**	**36**	**59**	**0**	**22**	**69**	**11**	**0**	**139**

***includes one dried up pond**

****includes 12 dried up ponds**

NOTE: BCFR = boreal chorus frog, BOTO = boreal toad, CATO = Canadian toad, CSFR = Columbia spotted frog, LTSA = long toed salamander, NLFR = northern Leopard frog, TISA = tiger salamander and WOFR = wood frog

4.2.2. Late Summer Pond Surveys

In late summer, species-specific shoreline surveys were conducted in two areas. East and north of Edmonton, researchers looked for evidence of Canadian toads in 32 ponds (based on historic records). No toads were found, but wood frogs were observed at three ponds and at least five boreal chorus frogs were heard at one pond. Similar surveys were conducted at 27 ponds in the Hinton area for Columbia spotted frogs. Three ponds had Columbia spotted frog tadpoles, one of which was further west than historic records of the species. Of the three ponds, one had previous records of Columbia spotted frogs, while the other two were new. In addition, six of the 27 ponds surveyed had wood frogs and one had boreal chorus frogs.

4.3 Education

Educational efforts took a variety of forms, including presentations, public displays, guided talks, and interpretive plays. An estimated total of 3941 people were informed about amphibians, the RANA program, the Alberta Amphibian Monitoring Program (AAMP) and wetland conservation throughout the province (Table 2). Details about presentations and activities are included in each RANA site report.

Table 2. Summary of educational programs delivered to the public from all RANA sites in 2004.

RANA SITE	Number of Presentations	Approximate # of People
Cypress	4	1865 +
Hinton	4	115
Kananaskis	5	1559 +
Lesser Slave Lake	3	99
Meanook	0	0
Saskatoon Island	7	303
Total	**23**	**3941 +**

5.0 DISCUSSION

We are gradually gathering long-term data on Alberta's amphibians, although it is still early to make inferences about population trends due to the stochasticity inherent in amphibian populations. Throughout the RANA program, all species have exhibited population fluctuations, although distribution has been relatively consistent.

Long-toed salamanders have been the focus of monitoring efforts in Kananaskis and Hinton due to their status of "sensitive". Pitfall trapping results have varied between sites; recruitment of young-of-the-year salamanders at the Hinton pond has been declining significantly, while the population at the Kananaskis pond appears relatively stable. It is important to determine if the decline at the Hinton pond is a localized event, possibly due to reduced water levels and changes in water quality, or representative of changes throughout the region. Pond survey data support that persistence of breeding salamanders has remained stable in the Hinton area, although we have not been able to evaluate whether young-of-the-year are being successfully recruited into the population. Further investigation at the Hinton trapping pond is recommended, and attempts should be made to survey ponds for young-of-the-year salamanders when possible. Evidence from selected ponds within the Kananaskis region suggests that human development and recreational activities (e.g., quads, dog walking) are negatively impacting some salamander breeding sites. In addition, fish stocking reduces or eliminates breeding salamanders and other amphibians from established breeding ponds (Pearson 2004, Rose 2004). It appears that long-toed salamander populations may be stable in some parts of their range, but are vulnerable to human pressure. We lack long-term studies on the impacts of various types of industrial and agricultural activities and must therefore take a conservative approach to protecting salamander habitat.

Northern leopard frogs have been the focal species at the Cypress Hills Provincial Park RANA site due to their "threatened" status. Unfortunately, monitoring was suspended in 2001 and 2002. A similar number of leopard frogs have been captured between years, and a similar number of ponds had evidence of leopard frogs in 2003 and 2004 (but evidence of breeding was not necessarily detected at all ponds). Continued monitoring is needed to determine persistence of breeding populations, but early indications suggest that the population may be stable in the provincial park. Cypress Hills is also the only RANA site where tiger salamanders have been captured, and with the exception of 1998, captures have been remained relatively low. Few tiger salamanders have been recorded during pond surveys, which may be indicative of a small population, although they can also be difficult to detect in pond surveys. Park staff and visitors should be encouraged to record observations of tiger salamanders and leopard frogs.

Wood frogs continue to be a ubiquitous species, and while exhibiting population fluctuations, they appear to be stable. Similarly, chorus frog populations have fluctuated, but continue to be relatively persistent. It has become increasingly apparent that chorus frogs can sometimes escape pitfall traps and consequently, may be under-represented. Despite their apparently common status, we lack comprehensive data on chorus frogs and should be cautious when interpreting population trend data. Furthermore, it is essential to continue monitoring populations of common species as indicators of possible changes in wetland quality and population declines; declines in less common species are more difficult to detect.

Two of Alberta's toad species have been detected during the RANA program, including only one record of the Canadian toad. Boreal toads have been observed regularly throughout the RANA program, occasionally exhibiting large population fluctuations. Although they appear to be relatively widespread and secure in Alberta, we lack information on their habitat requirements, and declines have been observed in other parts of their range. For this reason, boreal toads have been red listed by the IUCN. Anecdotal information suggests that boreal toads may be expanding east into Canadian toad habitat, but further research is required to confirm the apparent paucity of Canadian toads in east-central Alberta. Surveys in northeastern Alberta (i.e., Fort McMurray area) regularly detect Canadian toads, particularly in areas with sandy soil substrates (N. MacDonald, pers.comm.). Preliminary efforts to visit ponds with historic records of Canadian toads in east-central Alberta did not yield any observations. Some ponds had dried up, others were difficult to survey due to dense shoreline vegetation, and the timing of the surveys may have been too late to detect tadpoles (although no dispersing young-of-the-year were observed). Surveys should continue in 2005, visiting suitable ponds at different times of the breeding season to increase the likelihood of detection.

In the future, RANA will focus on pond surveys to track persistence of breeding amphibians, with emphasis on species at risk and species for which data are lacking. Due to logistical constraints, pitfall trapping will continue on a limited basis. Education programs will continue with efforts to reach more people through a variety of media and presentation venues.

6.0 LITERATURE CITED

Alberta Environmental Protection. 1994. Natural Regions of Alberta: Summary. Alberta Environmental Protection. Edmonton, AB. 18 pp.

Alberta Sustainable Resource Development. 2000. The general status of Alberta wild species, 2000. Alberta Environment/Alberta Sustainable Resource Development. Edmonton, AB. 46 pp.

Berg, C. 2004. Researching Amphibian Numbers in Alberta (RANA): Meanook Biological Research Station, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Berg, C. and R. Ferjuc. 2004. Researching Amphibian Numbers in Alberta (RANA): Saskatoon Island Provincial Park, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Berg, C. and C. Froyman. 2004. Researching Amphibian Numbers in Alberta (RANA): Cypress Hills Provincial Park, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Berg, C. and D. Miskew. 2004. Researching Amphibian Numbers in Alberta (RANA): Lesser Slave Lake Provincial Park, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Berg, C. and L. Wilkinson. 2004. Researching Amphibian Numbers in Alberta (RANA): Athabasca Valley Region - Hinton, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Pearson, K. J. 2004. The effects of introduced fish on the long-toed salamander (*Ambystoma macrodactylum*) in southwestern Alberta. M.Sc. Thesis. University of Lethbridge, Lethbridge, Alberta.

Pretzlaw, T., M. Huynh, L. Takats, and L. Wilkinson. 2002. Protocol for monitoring long-toed salamander (*Ambystoma macrodactylum*) populations in Alberta. Alberta Species At Risk Report No. 35. Alberta Sustainable Resource Development. Edmonton, AB.

Rose, S. 2004. Researching Amphibian Numbers in Alberta (RANA): Kananaskis, 2004. Report prepared for Alberta Sustainable Resource Development, Edson, AB.

Wilkinson, L. and S. Hanus. 2003. Long-toed salamander conservation in the Alberta foothills: 2002 field summary. Alberta Species At Risk Report No. 73. Alberta Sustainable Resource Development. Edmonton, AB.

7.0 APPENDICES

Appendix 1. Summary of historic amphibian captures at each RANA site.

A -Beaverhill Lake				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**TISA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1998	2073	17 (0.008)	1 (0.000)	182 (0.089)
1999	1257	1 (0.001)	1 (0.001)	111 (0.088)
2000	186	2 (0.011)	0 (0.000)	14 (0.075)

*BCFR (Boreal Chorus Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

B –Cypress Hills Provincial Park				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**NLFR*** Total # caught (# caught per trap night)	**TISA*** Total # caught (# caught per trap night)
1998	180	2 (0.011)	5 (0.028)	31 (0.172)
1999	927	4 (0.004)	20 (0.022)	12 (0.013)
2000	1440	2 (0.001)	19 (0.013)	15 (0.010)
2001	N/A	N/A	N/A	N/A
2002	N/A	N/A	N/A	N/A
2003	2629	2 (0.00076)	71 (0.027)	10 (0.0038)
2004	**2742**	**1 (0.0004)**	**61 (0.022)**	**58 (0.022)**

*BCFR (Boreal Chorus Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander).

C –Hinton and area				
Year	**# Trap Nights**	**BOTO*** Total # caught (# caught per trap night)	**LTSA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
2000	743	44 (0.058)	135 (0.180)	346 (0.468)
2001	1072	13 (0.012)	161 (0.150)	69 (0.064)
2002	1150	19 (0.017)	218 (0.190)	150(0.130)
2003	946	10 (0.011)	108 (0.11)	54 (0.057)
2004	**1078**	**35 (0.033)**	**123 (0.115)**	**41 (0.038)**

*BOTO (Boreal Toad), LTSA (Long-toed Salamander), WOFR (Wood Frog).

Appendix 1 (Cont.). Summary of historic amphibian captures at each RANA site.

D –Kananaskis and area					
Year	**# Trap Nights**	**BOTO*** Total # caught (# caught per trap night)	**CSFR*** Total # caught (# caught per trap night)	**LTSA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1998	1068	33 (0.031)	7 (0.007)	186 (0.174)	61 (0.057)
1999	383	11 (0.029)	2 (0.005)	10 (0.026)	12 (0.031)
2000	522	3 (0.006)	0 (0.000)	6 (0.011)	3 (0.006)
2001	484	11 (0.023)	1 (0.002)	34 (0.070)	8 (0.017)
2002**	1363	39 (0.029)	3 (0.002)	465 (0.341)	213 (0.156)
2003	1072	27 (0.03)	1 (0.0009)	283 (0.26)	218 (0.2)
2004	**544**	**13 (0.024)**	**0 (0.000)**	**217 (0.399)**	**26 (0.048)**

* BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).

**In 2002 a new RANA trapping site was established, Kuhn's Pond, due to dry-up of old pond for 3 consecutive years.

E –Lesser Slave Lake Provincial Park				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**BOTO*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1997	724**	8 (0.011)	7 (0.010)	73 (0.101)
1998***	3456	5 (0.001)	23 (0.007)	33 (0.001)
1999	3312	57 (0.017)	114 (0.034)	119 (0.036)
2000	3216	26 (0.008)	84 (0.026)	52 (0.016)
2001	840	29 (0.035)	817 (0.973)	83 (0.099)
2002	1680	299 (0.178)	156 (0.093)	196 (0.117)
2003	1360	52 (0.0038)	67 (0.049)	809 (0.59)
2004	**970**	**130 (0.134)**	**254 (0.262)**	**228 (0.235)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

**The number of trap nights is an estimate due to difficulties interpreting the number of trap malfunctions in original data.

***One Canadian toad was captured in 1998.

Appendix 1 (Cont.). Summary of historic amphibian captures at each RANA site.

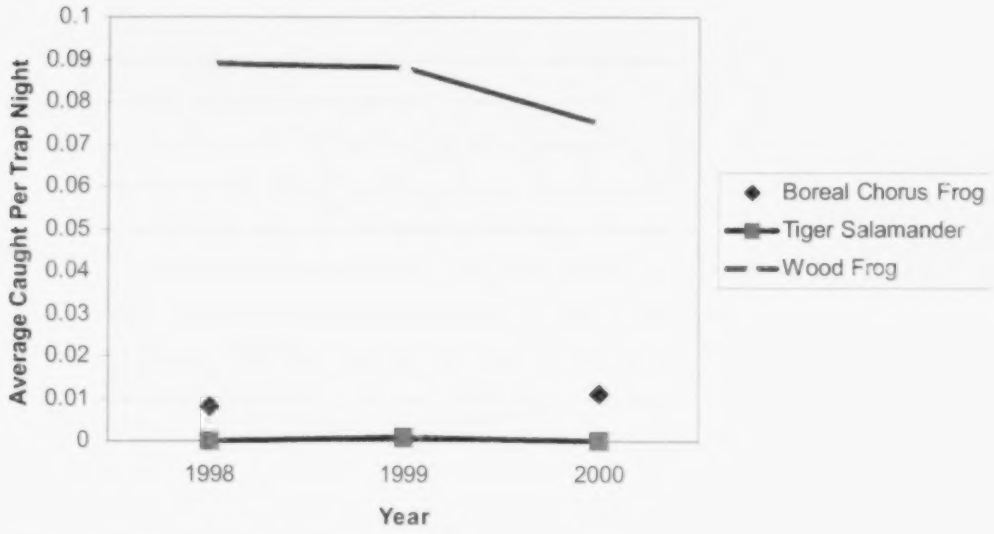
F–Meanook Biological Research Station				
Year	**# Trap Nights**	**BCFR*** **Total # caught (# caught per trap night)**	**BOTO*** **Total # caught (# caught per trap night)**	**WOFR*** **Total # caught (# caught per trap night)**
1997	518	4 (0.008)	3 (0.006)	193 (0.387)
1998	755	4 (0.005)	343 (0.454)	277 (0.367)
1999	630	2 (0.003)	7 (0.011)	23 (0.037)
2000	2090	6 (0.003)	125 (0.06)	36 (0.017)
2001	644	4 (0.006)	8 (0.012)	316 (0.49)
2002	714	1 (0.001)	12 (0.017)	65 (0.091)
2003	1571	16 (0.01)	23 (0.015)	982 (0.63)
2004	**1440**	**4 (0.004)**	**3 (0.002)**	**310 (0.215)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

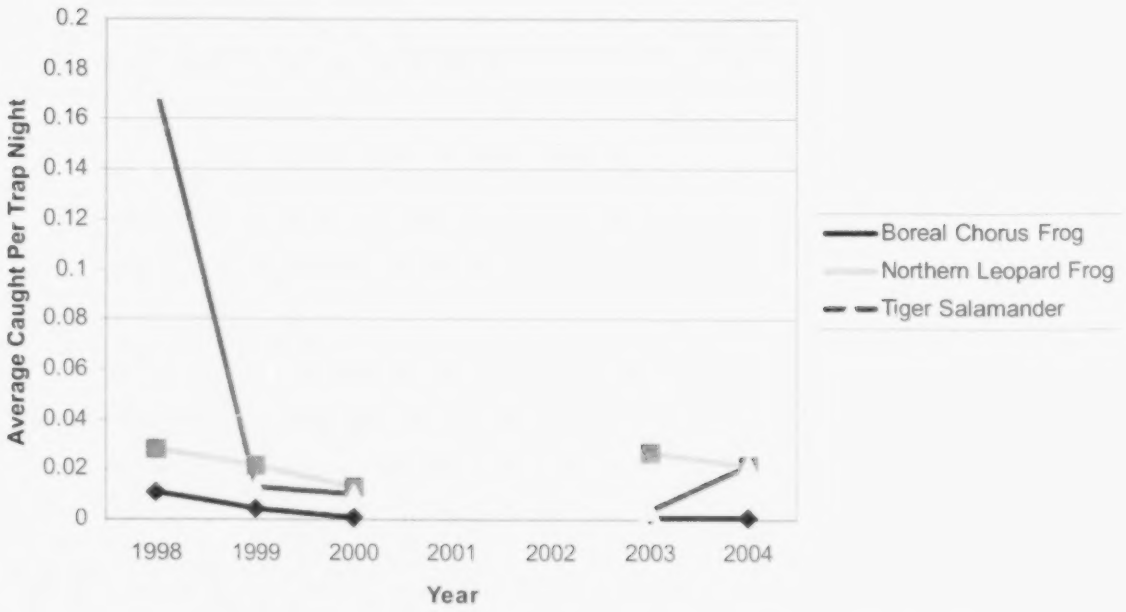
G–Saskatoon Island Provincial Park				
Year	**# Trap Nights**	**BCFR*** **Total # caught (# caught per trap night)**	**BOTO*** **Total # caught (# caught per trap night)**	**WOFR*** **Total # caught (# caught per trap night)**
1999	1070	9 (0.008)	0 (0.000)	128 (0.120)
2000	1081	17 (0.016)	2 (0.002)	44 (0.041)
2001	996	5 (0.005)	3 (0.003)	74 (0.074)
2002	980	4 (0.004)	0 (0.000)	165 (0.168)
2003	808	11 (0.014)	0 (0.000)	177 (0.22)
2004	**880**	**0 (0.000)**	**0 (0.000)**	**49 (0.056)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

Appendix 2. Trends in amphibian captures at each RANA site (1997-2004).

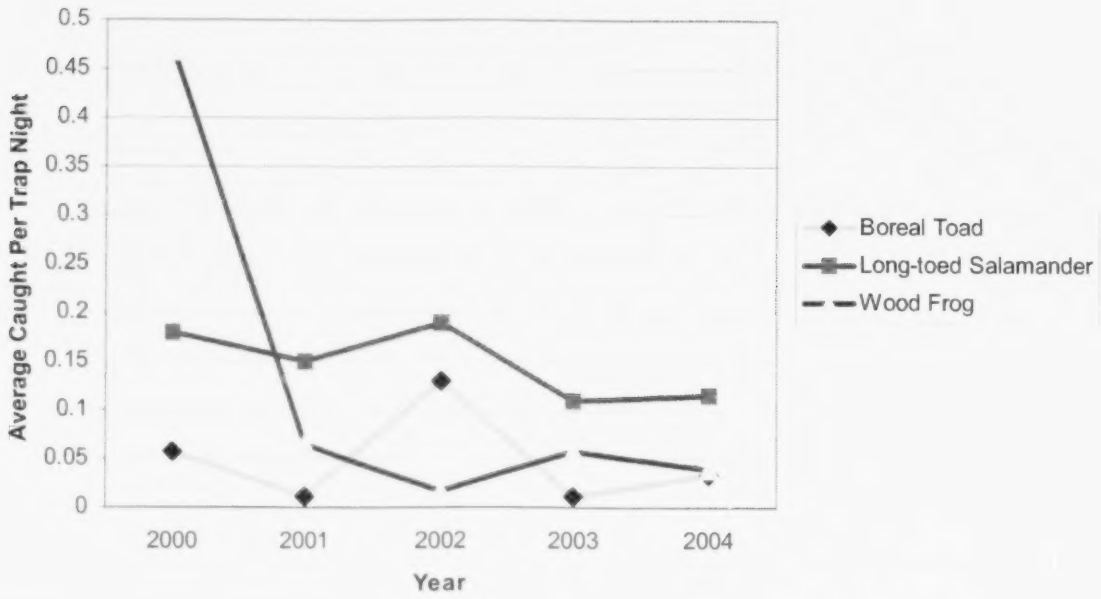


A. Beaverhill Lake (1998-2000).

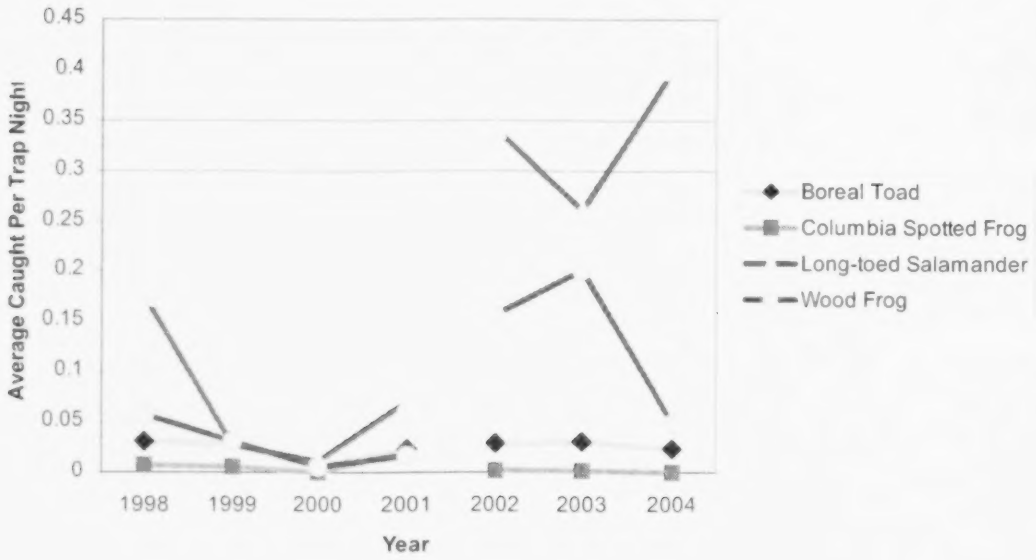


B. Cypress Hills Provincial Park (1998-2000, 2003-2004) *NOTE: no trapping in 2001, 2002.*

Appendix 2 (Cont). Trends in amphibian captures at each RANA site (1997-2004).

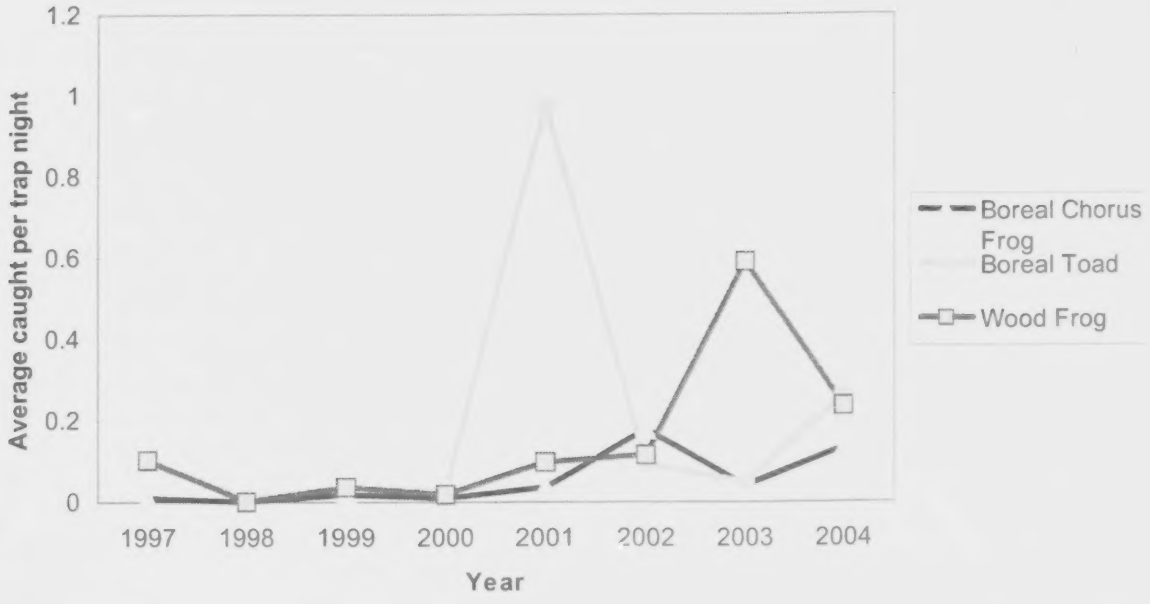


C. Hinton (and area) (2000-2004).

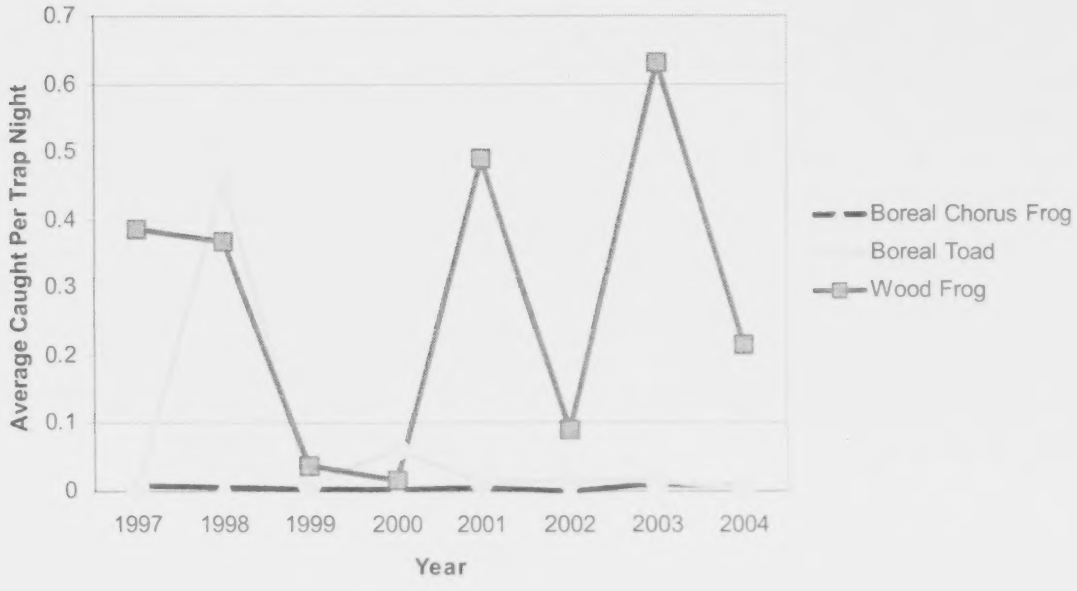


D. Kananaskis Country (and area) (1998-2004) *NOTE: In 2002 a new pond was used for trapping as the old pond dried up.*

Appendix 2 (Cont). Trends in amphibian captures at each RANA site (1997-2004).

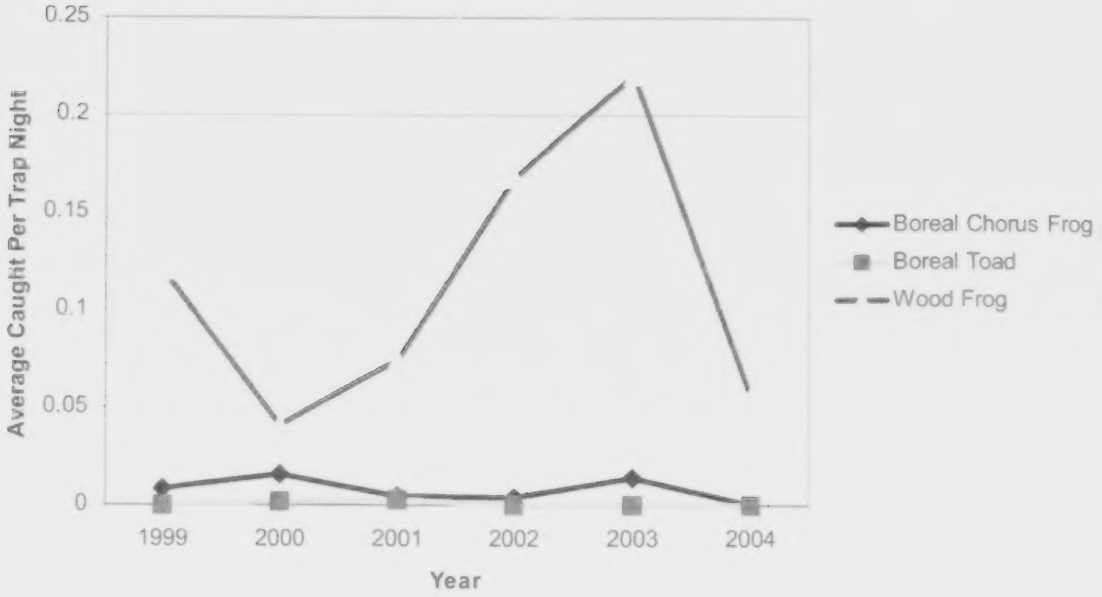


E. Lesser Slave Lake Provincial Park (1997-2004).



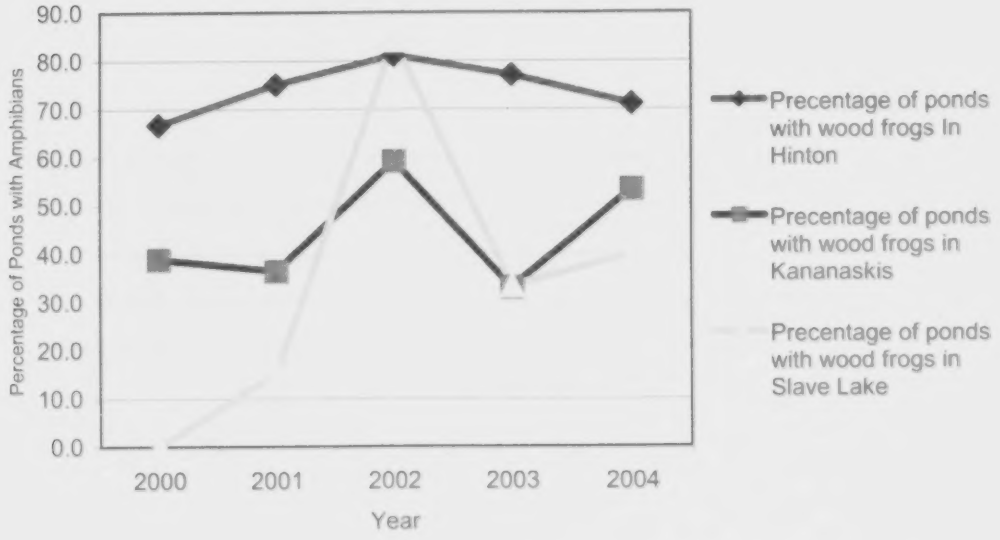
F. Meanook Biological Research Station (1997-2004).

Appendix 2 (Cont). Trends in amphibian captures at each RANA site (1997-2004).

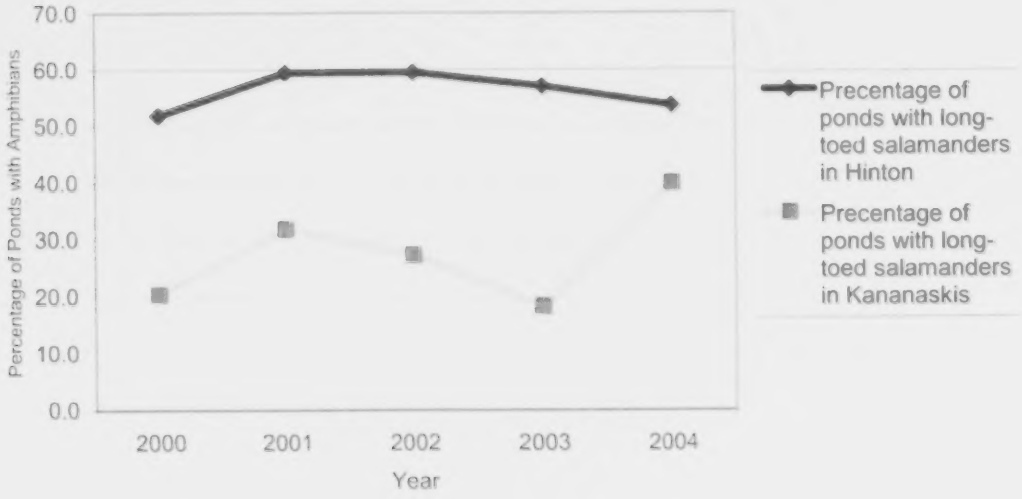


G. Saskatoon Island Provincial Park (1999-2004).

Appendix 3: Pond survey results for wood frogs, long-toed salamanders, boreal toads, boreal chorus frogs and Columbia spotted frogs at selected RANA sites.

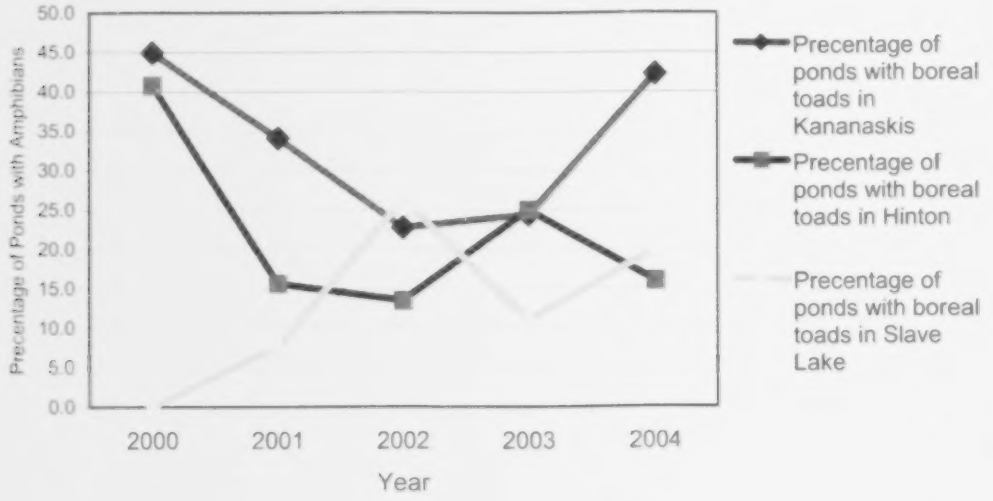


A- Wood frogs (2000-2004)

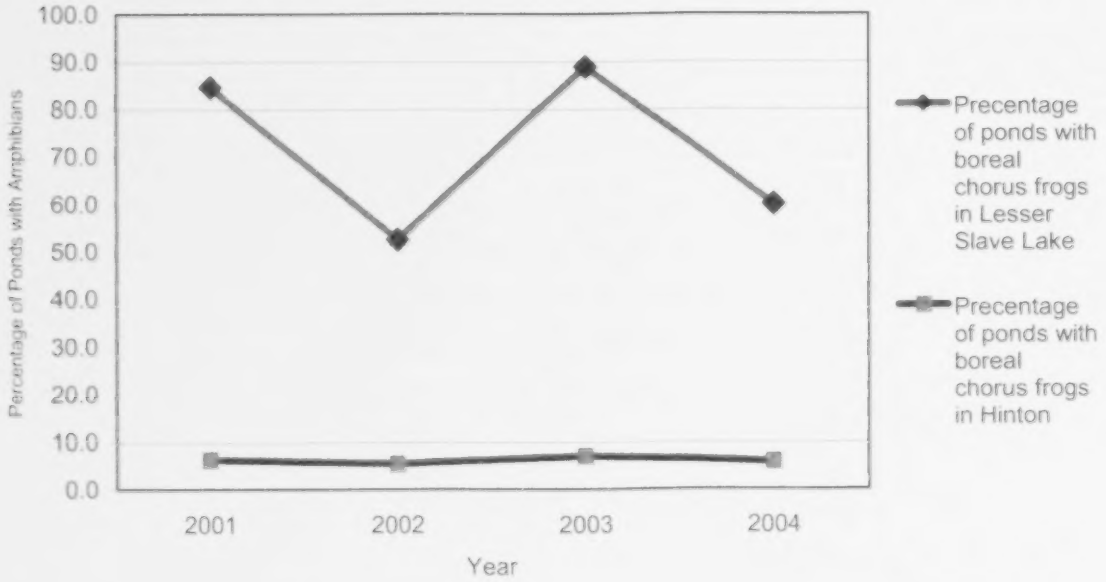


B- Long-toed salamanders (2000-2004)

Appendix 3 (Cont): Pond survey results for wood frogs, long-toed salamanders, boreal toads, boreal chorus frogs and Columbia spotted frogs at selected RANA sites.

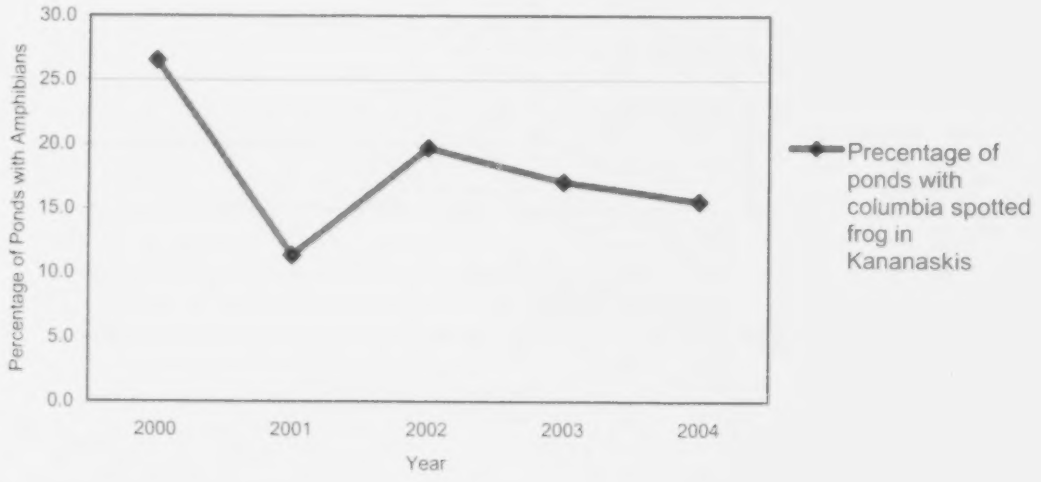


C. Boreal toads (2000-2004)



D. Boreal chorus frogs (2001-2004)

Appendix 3 (Cont): Pond survey results for wood frogs, long-toed salamanders, boreal toads, boreal chorus frogs and Columbia spotted frogs at selected RANA sites.



E. Columbia spotted frogs (2000-2004)

Species at Risk Report Series

For a complete list of titles in the Species at Risk report series, visit the following website, and select 'Project Reports':

http://www3.gov.ab.ca/srd/fw/speciesatrisk/index.html